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Energy future series

Thank you for joining!

The session will begin at 3.00pm (SGT)





Energy future series

Session 1 | Energy transition – Pathways to net zero



Energy future series

Our presenters and panelists



Moderator

Mike Hayes
Global Renewables
and Decarbonisation
Leader,
KPMG



Presenters

Sharad Somani
Partner & Head of
Infrastructure
Advisory, Head of
Infrastructure Sector –
Asia Pacific
KPMG Singapore



David Boyland
Asia Pacific Energy
Sector Lead,
Mott MacDonald



Panelists

Suzanne Gaboury,
Director General,
Private Sector
Operations
Department,
ADB



Hendrik Rosenthal,
Director – Group
Sustainability,
CLP Group



Wandrille Doucerain,
Head of Business
Development Data
Centre,
ENGIE South East
Asia



A future vision of energy

David Boyland | Energy Sector Lead, Asia Pacific, New Zealand and Australia | Mott MacDonald



01 Scene setting

Future energy series | Energy transitions — pathways to net zero



Potential for Asia Pacific energy market

How do we provide sustainable energy access to all these people?

The Asia Pacific region will need to be at the forefront of energy decarbonization.

Pressures on land use and its complex geography means it will also need to be increasingly at the forefront of technology innovation.



More than half of the world's population lives inside this circle.

02

Mott MacDonald — This is the Future

Future energy series | Energy transitions — pathways to net zero



H_2 HYDROGEN
ENERGY
STORAGE

Mott MacDonald This is the Future

- > Fuelling the energy transformation
- > Looking ahead to 2035



Fuelling the energy transformation: Our vision for a cleaner, low-carbon, job secure future.

Affordable, clean energy is critical to achieving a wide range of global targets and an area where we are making a significant contribution.

We cover
13 topics

Our **vision for clean energy** addresses challenges and opportunities for our clients and society – and sets out proposals for addressing them.

-
- Cleaner generation
 - Scaling up hydrogen
 - Storing up energy
 - Fuelling transport
 - Industrial clusters
 - Blended heating, natural cooling
 - Powerful new revenue streams
 - Agents of change (Through digitalisation)
 - Smarter utilities
 - One integrated system
 - Regulating the transition
 - Accessible, affordable, reliable
 - At the local level (Employment)

This is the future: The energy transformation from now to 2050

Mott MacDonald This is the Future

> Fuelling the energy transformation

> Looking ahead to 2035



03 Future themes

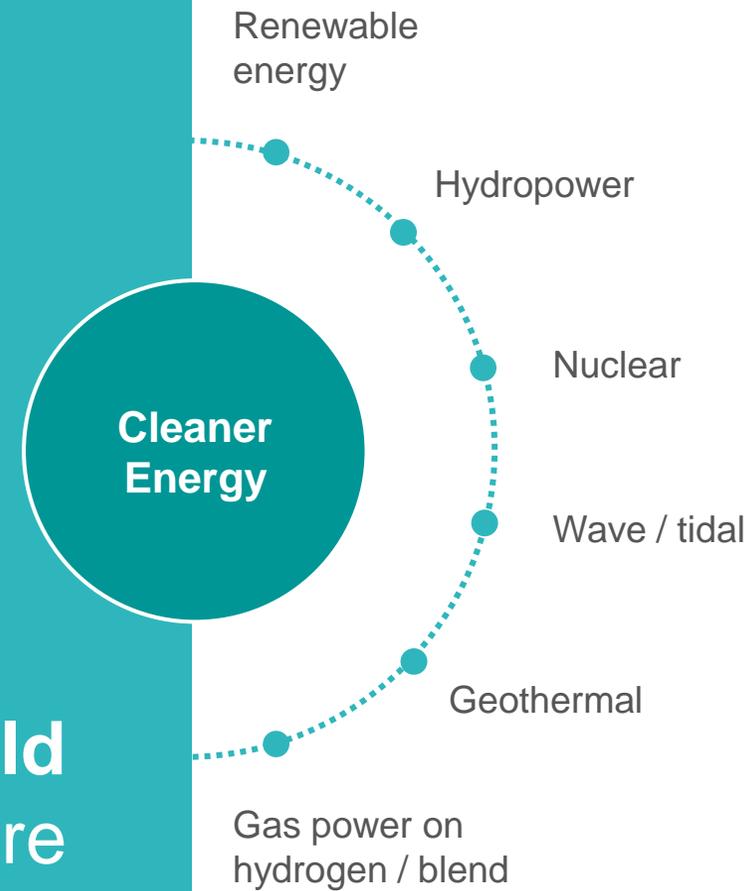
Future energy series | Energy transitions — pathways to net zero





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Blue Hydrogen

Carbon capture and storage

Green Hydrogen

Hydrogen derivatives

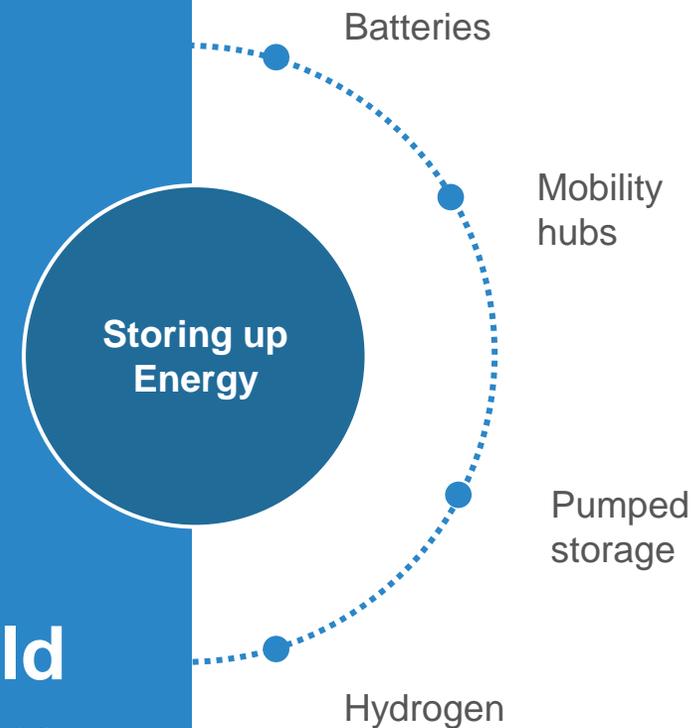
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> Looking ahead to 2035



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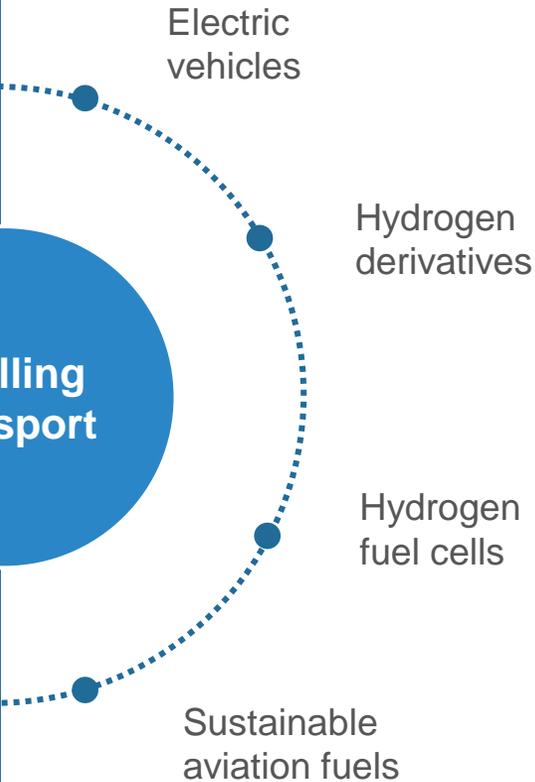
> Looking ahead to 2035





Mott MacDonald This is the Future

> Looking ahead to 2035



Electric vehicles

Hydrogen derivatives

Hydrogen fuel cells

Sustainable aviation fuels

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> Looking ahead to 2035

Industrial clusters

- CCUS
- Hydrogen

Blended heating, natural cooling

- Electrification
- Hydrogen
- Natural refrigerants
- District Cooling
- District Heating



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This is the Future

- > Fuelling the energy transformation
- > Looking ahead to 2035

Smarter utilities

- Smart meters
- Grid automation
- Data analytics
- Artificial intelligence

One integrated system

- Sector coupling
- Multi-sector digital twins

At the local level (Employment)

- Safeguarding employment
- National training programmes
- Health outcomes





Let us create a great
outcome for you

**Opening opportunities with
connected thinking.**

Together with our clients, we're solving the world's most intricate challenges. We search out the connections others fail to make, to unlock creativity and deliver better outcomes for the lives we touch every day.

mottmac.com





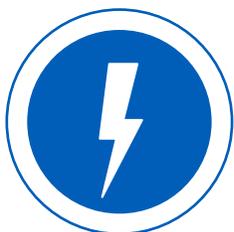
Energy Transition: Pathways to Net zero

Sharad Somani | Partner and Head of Infrastructure | KPMG





Agenda



Energy transition and the climate emergency

- Energy transition enables climate action
- Legally binding commitments expected at COP26



Forces driving the change

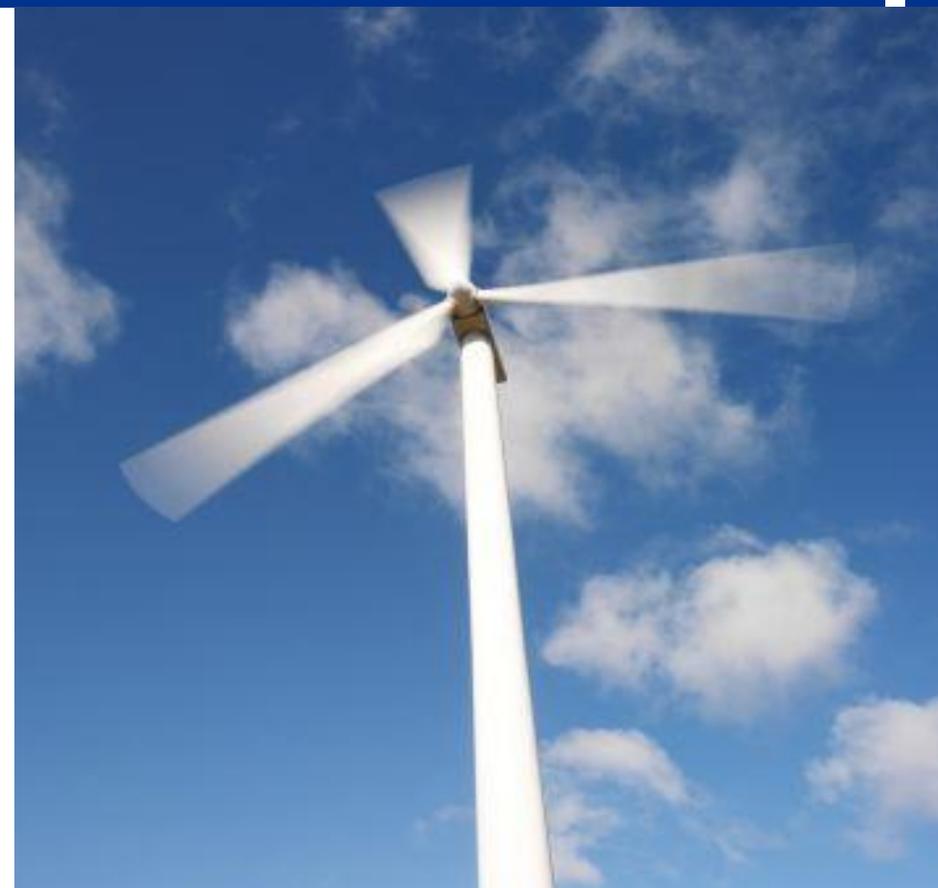
- Top-down and bottom-up forces
- Reinventing the utilities business model



4 pillars supporting energy transition

- Technology
- Regulations
- Sustainable financing
- ESG* considerations

*ESG: Environmental, Social, Governance



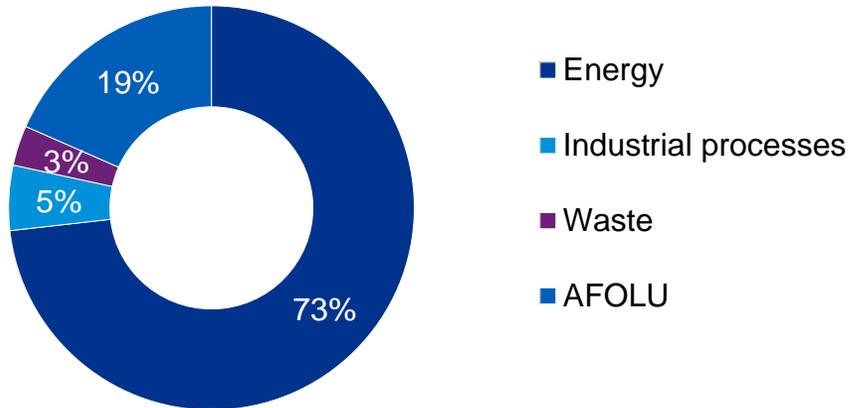


Energy transition is an essential component of climate action

Energy sector is key to global net-zero

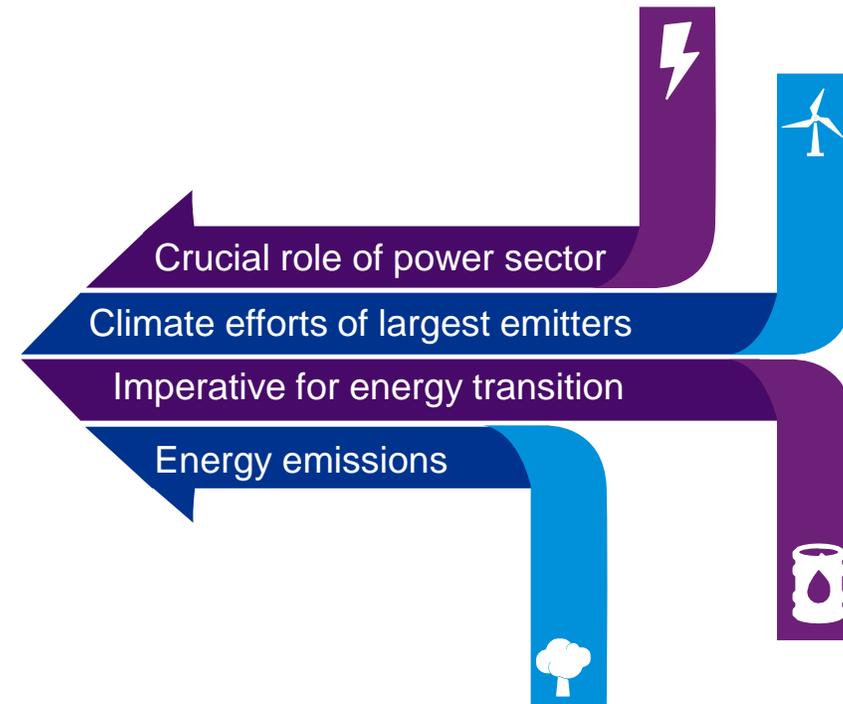
- About 55% of global emissions are covered by a net zero target in law, policy or pledge today
- Energy sector is responsible for around 73% of global GHG* emissions

Share of global greenhouse gas emissions by sector (%) [IPCC, 2015]



*AFOLU: Agriculture, Forestry and Land Use

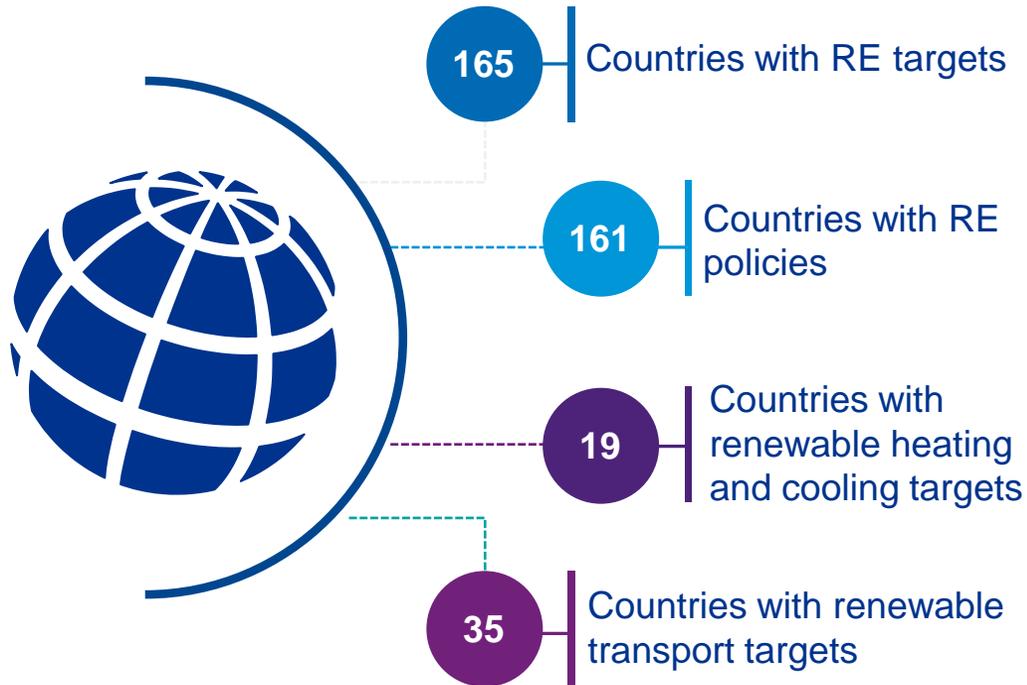
Energy sector is both the problem and the solution





Energy sector must transform in order to meet climate action targets

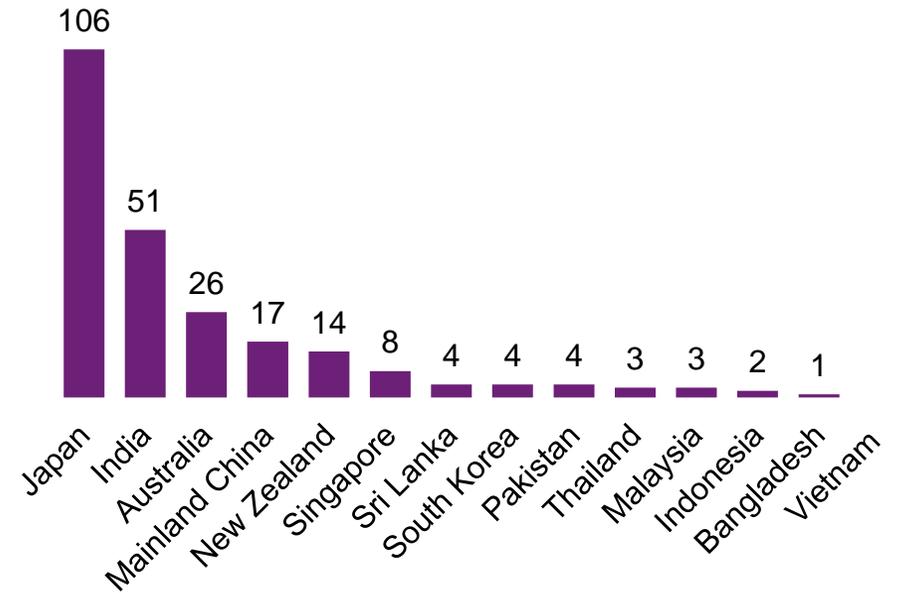
Global RE* targets (2020)



*RE: Renewable Energy

SBTs in Asia-Pacific (2021)

SBTs set by Corporates in Asia-Pacific [SBTi, 2021]





Clean energy demand is growing as consumers set climate targets

RE100 firms and technology companies are driving clean energy demand via Corporate PPAs

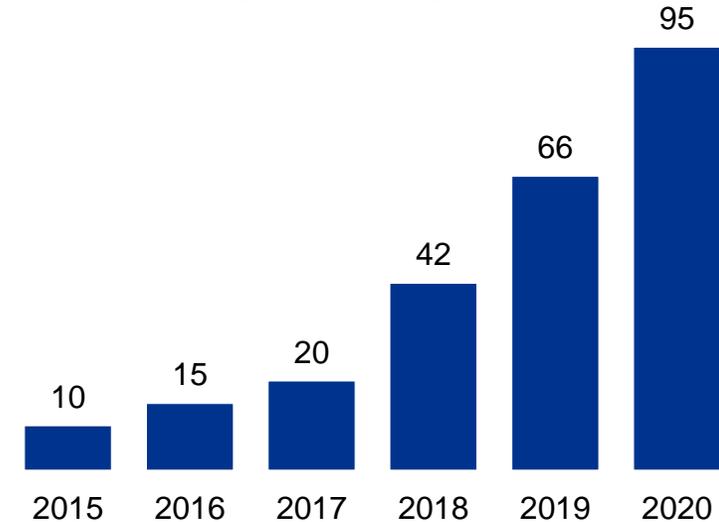
Power Purchase Agreements (PPAs) account for **26%** of RE100's sourced renewable power

41% of total RE100 members' **electricity usage comes from renewables**

RE100 companies' **combined demand for renewable electricity** more than UK's demand

Leading tech companies (Amazon, Apple, Facebook, Google and Microsoft) have signed green PPAs

Corporate RE PPAs (GW) (2015-2020)
[RE100, 2021]





Utilities are facing wider disruption from technology and market trends

Alignment of opportunities with the 4 Ds of energy transition

Decarbonization	Decentralization	Diversification	Digitization
<ul style="list-style-type: none"> Renewables in resource mix Energy efficiency Decline in power sector emissions 	<ul style="list-style-type: none"> Distributed power systems and peer-to-peer energy sales Distributed service provision Retail choice in electricity 	<ul style="list-style-type: none"> Energy-technology diversification Diversification into smart energy, demand side response and electric mobility services 	<ul style="list-style-type: none"> Price-responsive demand Energy as-a-service Consumer-centric business models

Key opportunities in ASPAC*

Phase out of coal	
Clean mobility and EVs*	
Increased RE contribution	
EE* in buildings & industry	
Green H2* applications	
Investment avenues for sustainable capital	

*ASPAC: Asia-Pacific, EVs: Electric Vehicles, EE: Energy Efficiency, H2: Hydrogen



The four levers of energy transition

Technology

- Renewables
- New fuels such as hydrogen and biofuels
- Decommissioning coal
- Digital technology

Policy and regulation

- Emissions targets
- Decommissioning regulation
- EV and EE policy
- Market liberalization



Financing

- Green bonds and other labelled instruments
- Green funds and multilateral financing
- Exclusion of coal from investment portfolios

ESG

- Emissions and climate
- Diversity, equity and inclusion
- Community impact and employment generation
- Just transition



Energy transition is being driven by new technologies



Renewables

- c.30% renewables in global power mix
- >260 GW of RE capacity added globally in 2020
- **Variable renewables** will dominate world's total power supply by 2050
- **4 pillars for RE integration:**
 - System operation
 - Enabling technologies
 - Business models
 - Market design



Hydrogen

- Component of **ASEAN Plan of Action for Energy Cooperation (APAEC) Phase II (2021-2025)**
- **Applications:**
 - Industry
 - Buildings
 - Power generation
 - Transport
- **Challenges:**
 - Storage
 - Competitiveness
 - Infrastructure



Digital technology

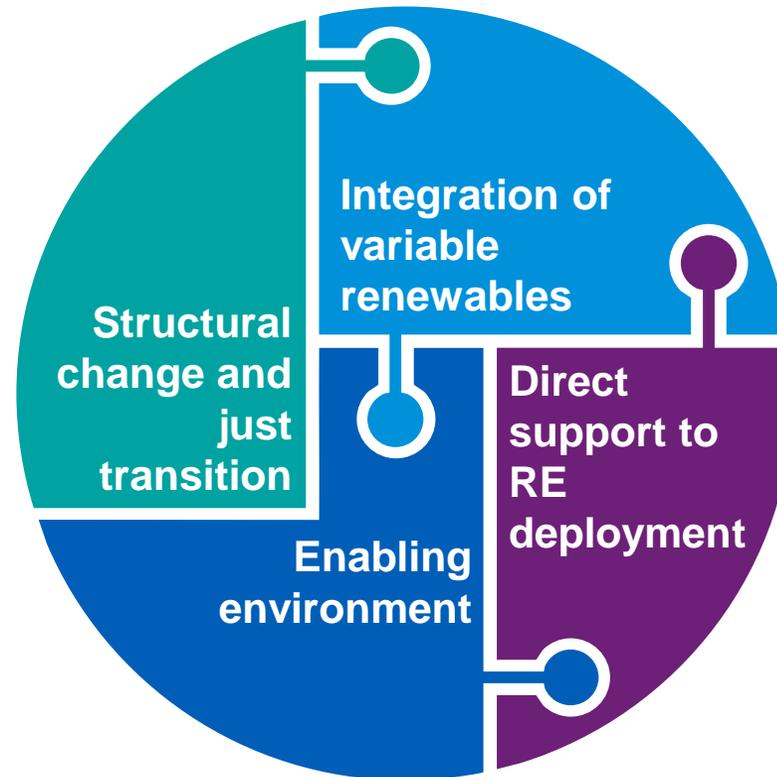
- More **connected, intelligent, efficient, reliable and sustainable** energy systems
- **Energy delivery** at right time, right place and at lowest cost
- **Transformational potential:**
 - Smart demand response
 - Integration of variable RE sources
 - Smart charging for EVs
 - Household solar PV



An enabling policy framework is required for a successful energy transition

- Labor market policies and social protection
- Industrial policy and market liberalization
- Trade policies
- Environmental and climate policies

- Ambitious energy plans
- Fossil fuel reforms (coal decommissioning)
- Policies for technology reliability
- EV and EE policy
- R&D and innovation policies



- Measures to enhance system flexibility
- Policies for integrating off-grid systems with main grid
- Policies for sector coupling
- Aligning EE and RE policies

- RE and emissions targets
- Regulatory and pricing policies (feed-in tariffs and auctions)
- Mandates and planned replacement
- Tradable certificates



ESG investments are growing rapidly in the region and climate is a material issue



Investment needed for
climate change mitigation

To mitigate climate change
within ASPAC, UN estimates
and annual investment need
of USD 1.5 trillion



Most attractive markets
for RE

China, India and Japan
present significant
investment and
implementation
opportunities in
renewables space



Countries taking the lead

Hong Kong, Singapore,
China, Japan, Indonesia,
India are the leading
jurisdictions in terms of
transaction activity



ESG investments &
assets in Asia

- Sustainable issuance
surged sevenfold in 4
years to USD 275 bn in
2020
- ESG AuM: USD 25.4 bn
by end of 2020



The labelled green finance landscape is growing rapidly with energy and transport are among the largest areas

The role of finance in a carbon net zero economy

Top-down ESG policies by investment houses can complement public policy and bottom-up initiatives

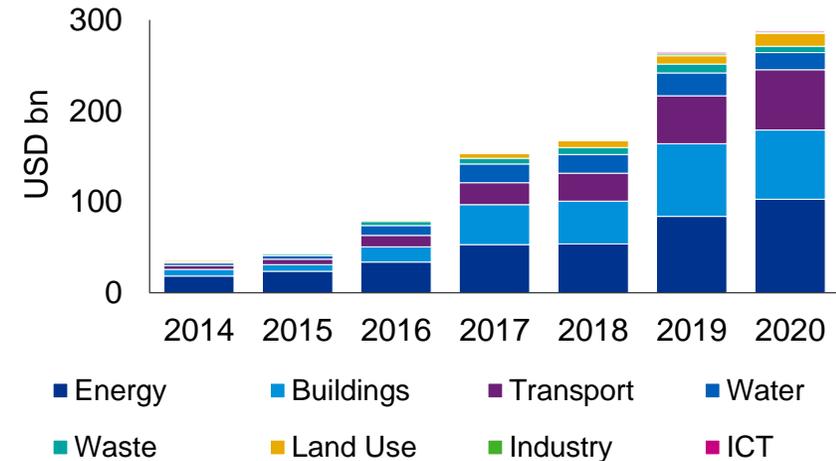
Singapore being ASEAN's green financing hub can provide green financing solutions tailored to the ASPAC region

Transition financing can drive fair and inclusive energy transition

Increase in the share of clean energy assets in investment portfolios will drive decarbonization across sectors

Global standards are increasingly being followed in ESG bonds implying the emergence of consensus in the sector

Amount of climate bonds issued by use of proceeds [Climate Bonds Initiative, 2021]



A glance at the world of 2020

Green bond market:
USD 290 bn

Sustainability bond market:
USD 160 bn

Climate-aligned bonds market:
USD 913.2 bn



The sustainable way forward for net zero



Supporting countries with a just transition from coal



Availability of sustainability and ESG finance



Scaling up energy efficiency in end-use sectors (buildings and industry)



Decarbonizing power sector by expanding support for RE and emerging fuels



Growth of clean mobility as a key end-use sector



Clean energy policies and regulations



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Energy future series

Session 2 Green Hydrogen – Fuel of the Future | 13 October 2021, 15:00-16:30 SGT

Session 3 Electrification of the Economy – Decarbonisation challenge | 19 October 2021, 15:00-16.30 SGT



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